ANGOPHORA KINO.

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The importance of the genus *Eucalyptus* and the almost universal occurrence of kino in these trees has thrown the subject of kino in the closely related genus *Angophora* almost entirely into the shade. Although some species are very common and yield it abundantly, a prejudice might arise against *Angophora* kinos being officially recognised as substitutes for that of *Pterocarpus*, partly because an odour is inadmissible in this substance. If a use should be found for them, I believe the kinos of any of the species may be mixed without detriment, as they appear to have practically the same composition when gathered under similar circumstances.

Angophoras are confined to the east coast of Australia; they are five in number, four of them being found in New South Wales, while one, *A. Woodsiana*, is peculiar to Queensland. *A. cordifolia* is peculiar to New South Wales; *A. intermedia* has the widest range, extending from Victoria to Queensland. *A. lanceolata* and *A. subvelutina* are found in Queensland as well as in New South Wales. They are all well known as "apple trees" (although some species have other names in addition).

The timber yielded by various species of *Angophora* is often much deteriorated by "gum-veins" consisting of kino, which is usually disposed in thin concentric circles, but also in pockets. It is, nevertheless, useful for wheelwrights' purposes and for fuel.

Angophora cordifolia, Cav., is a coast district tall shrub; I have not observed kino on it.

Angophora subvelutina, F.v.M. This is a fair-sized tree; kino has likewise not been recorded from this species, but this is doubtless because attention has not been drawn to the matter.

Angophora Woodsiana, Bail., (Syn. Queensland Flora, Bailey): "Often containing large quantities of liquid red gum (kino) in hollows of the timber like the bloodwood (*Eucalyptus corymbosa*, Sm.)" (Bailey); used by the settlers as a remedy in diarrhœa according to Dr. J. Bancroft.

Angophora intermedia, DC. This is the species (and also *A. lanceolata* to a less extent) which yields a watery, slightly astringent liquid when the trunk (particularly at swellings) is tapped. I have described this substance under the name of "liquid kino" in a paper, *Proc. R. S. Victoria*, 1889, p. 82. It is sometimes known as "cider," and it is worthy of note that some country people call all liquids obtained from our native trees "cider," whether they are drinkable or not.

A. intermedia forms a fine tree, perhaps the handsomest of the genus. The bark is fibrous, hence the kino gets entangled in it and is frequently wasted. I describe four specimens of its kino, illustrating the variability of its appearance and composition.

1. From Colombo (Lyttelton), near Candelo, N.S.W., gathered in June. Height of tree 30-50 ft., diam. 2-4 ft.

This kino had evidently exuded some time when collected. It is of a reddish-brown colour, and of a brittle nature. From this circumstance, the small masses in which it is obtained speedily lose their bright fresh appearance, assuming a colour very like that of ordinary dried currants. It forms a dull-looking powder of a pinkish-brown colour. Cold water acts slowly upon it, forming an orange-brown solution which may readily be decanted. The abundant residue (mainly consisting of Catechin) crumbles, forming a compact sediment of an Indian-red colour, and containing a quantity of woody matter. It is exceedingly tedious to extract the last portions of soluble matter. Except in regard to tints of filtrate and residue, all Angophora kinos behave in the way just described when treated with water, and yield, when treated with alcohol, a turbid liquid with a filtrate of an orange-brown colour.

2. Bangley Creek, near Cambewarra, collected in March, from trees in diam. 1-2 ft.

This is obviously a fresher sample than *A. intermedia* No. 1. It is so like *A. lanceolata* No. 2 as scarcely to be distinguished from it in bulk. In water its behaviour is similar to that of the preceding sample, but the solution is of a pale orange colour.

3. A second sample from Bangley Creek, Cambewarra, collected in April, from trees height 60-80 ft., diam. 1-3 ft.

It is a very clean sample, is neither perfectly new nor very old, is in smallish pieces, and of a garnet colour. On account of its friability, it can be reduced to a light orange powder between the fingers without much difficulty. The kino in bulk has a slightly dulled appearance, although individual fragments break with a bright fracture.

4. From Eastwood, near Sydney, collected in April, from trees height 80 ft., diam. 2 ft.

This sample much resembles No. 2. It is, however, decidedly darker in bulk, even inclining to liver-colour, and is somewhat opaque. It readily crushes between the fingers to a burnt sienna powder, slightly darker than the standard tint. It is evidently the oldest of the *A. intermedia* samples. To water it yields a rich orange-brown liquid when filtered. With alcohol the filtrate is of a dark orange-brown.

Angophora lanceolata, Cav. "Red Gum," "Orange Gum," "Rusty Gum."

In collecting kino from this tree it may be well to remind people that the smooth trunk might perhaps be mistaken by a careless observer for that of *Eucalyptus maculata*, but the two kinos cannot be confused even by a tyro. I submit notes on two kinos of this species. This kino is abundant, and readily gathered on account of the smoothness of the bark. The tree obtains its vernacular names owing to the kino stains on the pale-coloured stem.

1. From Botany, near Sydney, collected in March, trees 50 ft. high, and 1 to 2 feet in diameter. When freshly gathered this kino has a smell somewhat like sour wine, something resembling that of *E. maculata* but not so agreeable. As far as my experience goes it is quite characteristic. The two kinos possess other characteristics in common, one of which is the following. If they be digested in water, and the turbid liquid be treated with ether, two ethereal layers are formed, containing catechin in solution. This substance may readily be obtained by evaporation of the ether, and it possesses the characteristic odour of the kino from which it was obtained, the residue insoluble in ether being quite destitute of odour. The odoriferous principle (a volatile substance allied to cinnamene or styrol) is, however, so small that an hour's exposure of the ethereal extract to the atmosphere removes every trace of it.

The present sample had freshly exuded, is exceedingly brittle, has a bright fracture, ruby with a tinge of brown ; colour of powder orange-brown. So brittle is it that the lumps and vessels containing it become readily coated with fine powder.

In cold water it dissolves slowly, forming a liquid of the colour of brown sherry if left undisturbed. With alcohol it yields a pale orange-brown solution with a slightly muddy residue.

2. The Valley, Blue Mountains, N.S.W., collected in April, height 80-150 ft., diam. 1-2 ft.

The description of No. 1 will apply here with the following exceptions. In bulk it is hardly so red as No. 1, while its powder is of a dark buff colour. To cold water it behaves in the same way as No. 1 ; it is, however, less turbid and lighter in colour. With alcohol it yields a pale orange-brown solution.

The following table shows the composition of the kinos described in this paper, and I may observe that Angophora kinos would (if Eucalypts) be placed in my "Turbid Group."

ANGOPHORA KINO.

	INTERMEDIA.				LANCEOLATA.	
	No. 1.	No. 2.	No. 3.	No. 4.	No. 1.	No. 2.
Catechin and Tannic Acid ...	77·1	79·0	84·2	81·98	83·0	83·75
Aromatic substance, (?) Cinnamene (Styrol)	.....	.....	.....	.....	traces	traces
Ligneous matter and other impurities	4·4	4·2	·6	·72	·4	·8
Moisture	16·8	14·7	15·1	16·6	16·5	15·35
Ash	1·7	2·1	·1	·7	·1	·1
	100·0	100·0	100·0	100·00	100·0	100·00
Tannic Acid (Löwenthal) ...	52·32	57·4	59·43	53·84	55·37	50·3

The catechin and tannic acid in these kinos were determined together by extraction with alcohol. The tannic acid was separately determined by Löwenthal's process, on an original aqueous solution, and the catechin estimated by difference.